

Claims

1. Medical or dental handpiece (1) having a treatment tool driven by means of a drive part (11) via a transmission arrangement (5),

5 wherein the transmission arrangement (5) contains at least two planetary transmissions (20, 30) connected one after another, which each have

 - a sun gear (22, 32) mounted on a drive shaft (21, 31),
 - a planetary gear carrier (23, 33) having a plurality of uniformly distributed planetary gears (24, 34) cooperating with the sun gear (22, 32), and
 - 10 - a hollow gear (25, 35), fixed to a housing, surrounding the planetary gears (24, 34), having an inner toothing (26, 36),

 and wherein the planetary gear carrier (23) of at least one transmission stage (20) serves as drive shaft (31) and carrier of the sun gear (32) of the following transmission stage (30),

15 characterized in that,

 the drive shaft (21, 31) for each transmission stage (20, 30) is extended beyond the sun gear (22, 32) driven thereby and in that the planetary gear carrier (23, 33) belonging to this sun gear (22, 32) is arranged rotatably on the extension.
- 20 2. Medical or dental handpiece according to claim 1,

 characterized in that,

 the planetary gear carriers (23, 33) of all transmission stages (20, 30) are formed as hollow shafts and the extension of the drive shaft (21) for the first transmission stage (20) extends in substance over the entire length of the transmission

25 arrangement (5), centrally through the openings of the planetary gear carriers (23, 33).
3. Medical or dental handpiece according to claim 1 or 2,

 characterized in that,

 the planetary gear carriers (23, 33) are slidingly mounted with respect to the

30 drive shafts (21, 31) engaging therein.

4. Medical or dental handpiece according to any preceding claim, characterized in that,
the sun gears (22, 32) and the planetary gears (24, 34) of the individual transmission stages (20, 30) have in each case identical dimensions.

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5. Medical or dental handpiece according to claim 4, characterized in that,
the hollow gears (25, 35) for all transmission stages (20, 30) are formed by means of a single sleeve-like component (40) having an inner toothing (41).

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6. Medical or dental handpiece (1) having a treatment tool driven by means of a drive part (11) via a transmission arrangement (5), wherein the transmission arrangement (5) contains at least two planetary transmissions (20, 30) connected one after another, which each have

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- a sun gear (22, 32) mounted on a drive shaft (21, 31),
- a planetary gear carrier (23, 33) having three uniformly distributed planetary gears (24, 34) cooperating with the sun gear (22, 32), and
- a hollow gear (25, 35), fixed to a housing, surrounding the planetary gears (24, 34), having an inner toothing (26, 36),

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and wherein the planetary gear carrier (23) of at least one transmission stage (20) serves as drive shaft (31) and carrier of the sun gear (32) of the following transmission stage (30),

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characterized in that,
the hollow gears (25, 35) for all transmission stages (20, 30) are formed by means of a single sleeve-like component (40) having an inner toothing (41).

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7. Medical or dental handpiece according to claim 6, characterized in that,
the sun gears (22, 32) and the planetary gears (24, 34) of the individual transmission stages (20, 30) have in each case identical dimensions.

8. Medical or dental handpiece according to claim 6 or 7
characterized in that,

the drive shaft (21, 31) for each transmission stage (20, 30) is extended
beyond the sun gear (22, 32) driven thereby and in that the planetary gear carrier (23,
5 33) belonging to this sun gear (22, 32) is arranged rotatably on the extension.

9. Medical or dental handpiece according to claim 8
characterized in that,

the planetary gear carriers (23, 33) of all transmission stages (20, 30) are
10 formed as hollow shafts and the extension of the drive shaft (21) for the first
transmission stage (20) extends in substance over the entire length of the transmission
arrangement (5), centrally through the openings of the planetary gear carriers (23, 33).

10. Medical or dental handpiece according to claim 8 or 9
15 characterized in that,

the planetary gear carriers (23, 33) are slidingly mounted with respect to the
drive shafts (21, 31) engaging therein.

11. Medical or dental handpiece according to any preceding claim,
20 characterized in that,

the drive shaft (21) for the first transmission stage (20) is mounted with
respect to the handpiece housing (2) or a transmission housing (9) by means of a ball
bearing (6).

12. Medical or dental handpiece according to any preceding claim,
25 characterized in that,

the planetary gear carrier (33) of the last transmission stage (30) is mounted
with respect to the handpiece housing (2) or a transmission housing (9) by means of at
least one ball bearing (7, 8).

13. Medical or dental handpiece according to any preceding claim,
30 characterized in that,

the planetary gear carriers (23, 33) of the transmission stages (20, 30) in each
case carry three planetary gears (24, 34).

14. Medical or dental handpiece according to any preceding claim,
characterized in that,
components of the transmission stages (20, 30) are at least partially of a
5 ceramic material.

15. Medical or dental handpiece according to claim 14,
characterized in that,
the drive shafts (21, 31) or planetary gear carriers (23, 33) of the transmission
10 stages (20, 30) are of a ceramic material.

16. Medical or dental handpiece according to claim 14 or 15,
characterized in that,
the gears (22, 24, 32, 34) of the transmission stages (20, 30) are of a ceramic
15 material.

17. Medical or dental handpiece according to any of claims 14 to 16,
characterized in that,
the ceramic material is silicon nitride.
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18. Medical or dental handpiece according to any preceding claim,
characterized in that,
the transmission arrangement (5) is of two planetary transmissions (20, 30)
connected one after the other.
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19. Medical or dental handpiece according to any preceding claim,
characterized in that,
the transmission stages (20, 30) have in each case a transmission ratio of 3:1.

20. Medical or dental handpiece according to any preceding claim,
characterized in that,
the components of the transmission arrangement (5) are arranged in a
transmission housing (9) formed sleeve-like.
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21. Medical or dental handpiece according to claim 20,
characterized in that,
the transmission arrangement (5) can be emplaced in the handpiece (1), or
removed therefrom, as a structural unit.

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22. Medical or dental handpiece (1) having a treatment tool driven by
means of a drive part (11) via a transmission arrangement (5),
wherein the transmission arrangement (5) contains at least one planetary
transmission (20, 30), which has

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- a sun gear (22, 32) mounted on a drive shaft (21, 31),
- a planetary gear carrier (23, 33) having a plurality of uniformly distributed
planetary gears (24, 34) cooperating with the sun gear (22, 32), and
- a hollow gear (25, 35), fixed to a housing, surrounding the planetary gears
(24, 34), having an inner toothing (26, 36);

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characterized in that,
components of the planetary transmission (20, 30) are at least partially of a
ceramic material.

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23. Medical or dental handpiece according to claim 22,
characterized in that,
the drive shaft (21, 31) or planetary gear carrier (23, 33) of the planetary
transmission (20, 30) is of a ceramic material.

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24. Medical or dental handpiece according to claim 22 or 23,
characterized in that,
the gears (22, 24, 32, 34) of the planetary transmission (20, 30) are of a
ceramic material.

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25. Medical or dental handpiece according to any of claims 22 to 24,
characterized in that,
the ceramic material is silicon nitride.

26. Transmission arrangement (5) for a medical or dental handpiece (1), for the production of a drive connection between a drive part (11) and a treatment tool,

wherein the transmission arrangement (5) contains at least two planetary transmissions (20, 30) connected one after another, which each have

- a sun gear (22, 32) mounted on a drive shaft (21, 31),
- a planetary gear carrier (23, 33) having three uniformly distributed planetary gears (24, 34) cooperating with the sun gear (22, 32), and
- a hollow gear (25, 35), fixed to a housing, surrounding the planetary gears (24, 34), having an inner toothing (26, 36),

and wherein the planetary gear carrier (23) of at least one transmission stage (20) serves as drive shaft (31) and carrier of the sun gear (32) of the following transmission stage (30),

characterized in that,

the drive shaft (21, 31) for each transmission stage (20, 30) is extended beyond the sun gear (22, 32) driven thereby and in that the planetary gear carrier (23, 33) belonging to this sun gear (22, 32) is arranged rotatably on the extension.

27. Medical or dental handpiece according to claim 26,

characterized in that,

the planetary gear carriers (23, 33) of all transmission stages (20, 30) are formed as hollow shafts and the extension of the drive shaft (21) for the first transmission stage (20) extends in substance over the entire length of the transmission arrangement (5), centrally through the openings of the planetary gear carriers (23, 33).

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28. Transmission arrangement (5) for a medical or dental handpiece (1), for the production of a drive connection between a drive part (11) and a treatment tool,

- wherein the transmission arrangement (5) contains at least two planetary transmissions (20, 30) connected one after another, which each have
- a sun gear (22, 32) mounted on a drive shaft (21, 31),
 - a planetary gear carrier (23, 33) having three uniformly distributed planetary gears (24, 34) cooperating with the sun gear (22, 32), and
 - a hollow gear (25, 35), fixed to a housing, surrounding the planetary gears (24, 34), having an inner toothing (26, 36),
- and wherein the planetary gear carrier (23) of at least one transmission stage (20) serves as drive shaft (31) and carrier of the sun gear (32) of the following transmission stage (30),
- characterized in that,
- the hollow gears (25, 35) for all transmission stages (20, 30) are formed by means of a single sleeve-like component (40) having an inner toothing (41).

29. Transmission arrangement (5) for a medical or dental handpiece (1), for the production of a drive connection between a drive part (11) and a treatment tool,

- wherein the transmission arrangement (5) contains at least one planetary transmission (20, 30), which has
- a sun gear (22, 32) mounted on a drive shaft (21, 31),
 - a planetary gear carrier (23, 33) having a plurality of uniformly distributed planetary gears (24, 34) cooperating with the sun gear (22, 32), and
 - a hollow gear (25, 35), fixed to a housing, surrounding the planetary gears (24, 34), having an inner toothing (26, 36),
- characterized in that,
- components of the planetary transmission (20, 30) are at least partially of a ceramic material.

30. Transmission arrangement according to claim 29, characterized in that, the ceramic material is silicon nitride.